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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Atsuo Omaru

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EXAMINER

DOVE, TRACY MAE

ART UNIT

PAPER NUMBER

1795

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 09/810,962	<b>Applicant(s)</b> OMARU ET AL.	
	<b>Examiner</b> TRACY DOVE	<b>Art Unit</b> 1795	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 May 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3 and 4 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3 and 4 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

This Office Action is in response to the communication filed on 5/22/09.

Applicant's arguments have been considered, but are not persuasive. Claims 1, 3 and 4 are pending.

#### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/22/09 has been entered.

#### ***Claims Analysis***

The claimed invention recites the graphite in the negative electrode has a "rhombohedral structure". The specification discloses that natural graphite has a "rhombohedral structure" (page 21) and that natural graphite having a "rhombohedral structure" may be used as a starting material (page 42). Thus, in view of the teaching of the present specification, natural graphite contains a "rhombohedral structure".

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claims recite "a band-shaped negative electrode consisting of a graphite containing material", which is not supported by the specification as filed. At page 31, lines 3-11 the specification discloses the negative electrode contains a negative electrode mixture comprising a carbon material and a binder. The negative electrode mixture is then applied to both sides of a negative electrode collector made of copper in a band shape. A negative electrode in a band shape was thereby formed. Thus the negative electrode does not "consist" of the graphite containing material, but also includes at least a binder and collector.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 3 and 4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Each of claims 1, 3 and 4 recite "the graphite particles are pressed such that the specific surface area of the graphite is increased by at least 2.5 times that of the specific surface area before being pressed", which is indefinite. It is unclear what the specific surface area value range of the claimed material encompasses.

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Each of claims 1, 3 and 4 recite “a saturated tapping density of  $1.2 \text{ g/cm}^3$  or more”, which is indefinite. The tapping density is dependent on the method used to obtain the tapping density value, for example, the number of times tapped and the container size used to hold the material.

To the extent the claims are understood in view of the 35 USC 112 rejections above, note the following prior art rejections.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashi et al., JP 10-334915.

Hayashi teaches a rechargeable battery having an electrode comprising graphite particles. A dynamic energy process is applied to a graphite material so that the apparent density ratio between before and after the process becomes 1.1 or above. The apparent density ratio between before and after the process equals the tap density after the process/tap density before the process, and this is to become the index of sphericity. See abstract.

The intensity ratio R of a Raman spectrum is preferably 0.4 or less. In the Raman spectrum analysis, the intensity IA of peak PA near  $1580 \text{ cm}^{-1}$  and the intensity

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IB of peak PB near  $1360\text{ cm}^{-1}$  were measured (0035). Therefore,  $R=IB/IA=H_{sd}/H_{sg}$  and  $H_{sg}/H_{sd}=1/R=G_s$ . Since R is 0.4 or less, Hayashi teaches  $G_s$  is 2.5 or more.

The tap density ratio before and after processing is 1.7 or greater, more preferably 1.1 or greater. It is desirable to have a tapping density after processing of 0.5-2 g/cc (see page 4, paragraph 0023-0024). The tapping density of the graphite material is preferably in the range of 0.7-1.2 g/cc (see page 7, paragraph 0042). The true density of the graphite material is 2.25 g/cc or more (claim 2). Thus a packing characteristic index (tap density/true density) of Hayashi may be 0.53 ( $1.2/2.25$  = tap density/true density). The apparent density gravity value of Hayashi is obtained by the tap method (0025).

The specific surface area of the graphite particles after processing (pulverizing) is below  $25\text{ m}^2/\text{g}$  and more than  $0.5\text{ m}^2/\text{g}$ , preferably 2-10  $\text{m}^2/\text{g}$  (0035). Table 4 shows different graphite material properties before and after a dynamic energy process/treatment. The SA in Table 4 represents surface area with the surface area of the graphite being  $19.1\text{ m}^2/\text{g}$  before treatment and  $8.9\text{ m}^2/\text{g}$  after treatment (Example 13). The surface area after treatment is 2.1 times that before treatment. The energy process is specifically pulverization. Hayashi teaches a surface area of the graphite being  $4.5\text{ m}^2/\text{g}$ ,  $4.8\text{ m}^2/\text{g}$ ,  $8.7\text{ m}^2/\text{g}$  or  $19.1\text{ m}^2/\text{g}$  before treatment (Table 4) and preferably 2-10  $\text{m}^2/\text{g}$  after treatment (0035). Hayashi teaches an electrode having a graphite material with a (d002) distance between layers of 0.34nm or less (claim 2).

Hayashi teaches natural graphite of high orientation/high crystallinity is used (0013-0014). High crystallinity natural graphite is known to have a rhombohedral

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structure (diamond structure). Hayashi teaches the natural graphite may be subjected to a surface grinding process (0029). Natural graphite has a rhombohedral structure (as stated in the present specification, see above). A polypropylene separator is disclosed at [0043].

Hayashi does not explicitly recite the graphite material has at least two peaks on a differential thermogravimetric curve. However, the graphite material of Hayashi inherently has at least two peaks on a differential thermogravimetric curve because the graphite material of Hayashi has a Raman spectrum having two distinct signal peaks. The two distinct signal peaks on the Raman spectrum indicate the graphite material contains two distinct carbon materials. A graphite material having two distinct carbon materials would inherently provide at least two peaks on a differential thermogravimetric curve. Hayashi does not explicitly state the weight rejection as measured by DTG, is at least 5% and at most 40%. However, the limitation is a product-by-process limitation, which is not given patentable weight in the absence of unexpected results.

The limitation regarding stacking band shaped layers of the battery is well known in the art. A battery must have a positive electrode and a negative electrode that are separated. Stacking a band positive electrode, a first separator, a band negative electrode and a second separator was not invented by Applicant. This is a well known battery structure.

\*

Claims 1, 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita et al., EP 0861804 A1.

Morita teaches a nonaqueous electrolyte secondary battery having a positive electrode, a negative electrode and a polypropylene separator (9:39-10:52). The negative electrode includes a carbon coated carbonaceous core material. The core material may be natural graphite (rhombohedral structure) having a ratio of peak strength around  $1360\text{ cm}^{-1}$  to peak strength around  $1580\text{ cm}^{-1}$  determined by Raman spectroscopy of 0.5 or less (4:25-46). The carbon material has a specific surface area of  $5\text{ m}^2/\text{g}$  or less, preferably about  $1\text{-}5\text{ m}^2/\text{g}$  (3:8-13). The polypropylene separator is between the positive and negative electrodes (8:4-13). The coated carbon material has a true density of about  $1.5\text{-}2.26\text{ g/cm}^3$ , preferably about  $1.8\text{-}2.26\text{ g/cm}^3$  (5:21-24).

Morita does not explicitly recite the graphite material has at least two peaks on a differential thermogravimetric curve. However, the graphite material of Morita inherently has at least two peaks on a differential thermogravimetric curve because the graphite material of Morita has a Raman spectrum having two distinct signal peaks. The two distinct signal peaks on the Raman spectrum indicate the graphite material contains two distinct carbon materials. A graphite material having two distinct carbon materials would inherently provide at least two peaks on a differential thermogravimetric curve. Morita does not explicitly state the weight rejection as measured by DTG, is at least 5% and at most 40%. However, the limitation is a product-by-process limitation, which is not given patentable weight in the absence of unexpected results.

The limitation regarding stacking band shaped layers of the battery is well known in the art. A battery must have a positive electrode and a negative electrode that are separated. Stacking a band positive electrode, a first separator, a band negative



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electrode and a second separator was not invented by Applicant. This is a well known battery structure.

### ***Response to Arguments***

Applicant's arguments filed 5/22/09 have been fully considered but they are not persuasive. Applicant argues neither Hayashi nor Morita discloses the graphite containing material is characterized by a saturated tapping density of  $1.2 \text{ g/cm}^3$  or more. However, Hayashi teaches the tap density ratio before and after processing is 1.7 or greater, more preferably 1.1 or greater. It is desirable to have a tapping density after processing of 0.5-2 g/cc (see page 4, paragraph 0023-0024). The tapping density of the graphite material is preferably in the range of 0.7-1.2 g/cc (see page 7, paragraph 0042). The true density of the graphite material is 2.25 g/cc or more (claim 2). Thus a packing characteristic index (tap density/true density) of Hayashi may be 0.53 ( $1.2/2.25$  = tap density/true density). The apparent density gravity value of Hayashi is obtained by the tap method (0025). Therefore, the apparent density gravity values of Hayashi are tapping density values.

Regarding Morita, the tapping density values of the claimed invention are obvious in view of the true density values disclosed by Morita. Note the tapping density values of the claimed invention have been rejected under 35 USC 112, 2<sup>nd</sup>.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

July 16, 2009

/TRACY DOVE/

Primary Examiner, Art Unit 1795